AF ITW

PTO/SB/21 (03-03)
Approved for use through 04/30/2003. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/826,712
Filing Date	April 5, 2001
First Named Inventor	Johann Engelhardt
Art Unit	2872
Examiner Name	Nguyen, Thong Q.
Total Number of Pages in This Submission: 40	Attorney Docket Number: 21295.23

ENCLOSURES (*Check all that apply*)

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
- ☐ After Allowance Communication to a Technology Center (TC)
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☑ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☐ Other Enclosure(s) (please Identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual	Maria M. Eliseeva
Signature	Maria Eliseeva
Date	August 12, 2004

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231 on this date: August 12, 2004

Typed or printed	Deborah Celeste		
Signature	Deborah Celeste	Date	August 12, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re:	Johann Engelhardt, et al.	Confirmation No:	3955
Serial No:	09/826,712	Group:	2872
Filed:	April 5, 2001	Examiner:	Nguyen, Thong Q.
For:	Double Confocal Scanning Microscope	Confirmation No:	3955

APPELLANTS' BRIEF (SUBSTITUTE)

Mail Stop Appeal Brief- Patents
Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

This is the Applicants' appeal from the final Office Action, mailed July 31, 2003, (Paper No. 21), and Notification of Non-Compliance, mailed July 13, 2004.

Real Party of Interest

Leica Microsystems Heidelberg GmbH is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1-4, 8-10 and 16-20 are pending in this application. Claims 1-4, 8-10 and 16-20 stand more than twice rejected pursuant to the outstanding Office Action.

Status of Amendments

All amendments have been entered. There were no post final amendments or proposed amendments.

Summary of the Invention

From the Abstract: The present invention concerns a double confocal scanning microscope (1) having an illuminating beam path (2) of at least one light source (3), and a detected beam path (4) of at least one detector (5), and in order to achieve almost the theoretically possible resolution capability, in particular in the context of multi-color fluorescence applications, is characterized in that the optical properties in particular of the components (6, 10, 13, 14) arranged in the beam path are coordinated with one another in such a way that the accumulated aberrations, with respect to the optical axis (33) and/or at least one surface (18, 19, 20) in the specimen region, are at least of the order of magnitude of the theoretically achievable resolution capability.

Issues

I. Whether Claims 1-3, 8-9, and 19-20 are patentable under 35 U.S.C. 103(a) over Hell (EP No. 491289, "Hell") in view of Picard (U.S. Patent No. 4,965,441, "Pickard").

II. Whether Claims 1-4, 8-9, and 19-20 are patentable under 35 U.S.C. 103(a) over Schoppe (DE 39 18 412, "Schoppe") in view of Picard.

III. Whether Claims 10 and 16-18 are patentable under 35 U.S.C. 103(a) over over Hell in view of Picard as applied to Claim 1 and further in view of Stern et al. (U.S. Patent 5,790,242).

Grouping of Claims

Group I. Claims 1-4, 8-9 and 19-20, which stand rejected for obviousness based on a combination of two references, stand or fall together.

Group II. Claims 10 and 16-18, which stand rejected for obviousness based on a combination of three references, stand or fall together.

Argument with respect to Group I

Whether Claims 1-3, 8-9, and 19-20 are patentable under 35 U.S.C. 103(a) over Hell (EP No. 491289, "Hell") in view of Picard (U.S. Patent No. 4,965,441, "Pickard"), and whether Claims 1-4, 8-9, and 19-20 are patentable under 35 U.S.C. 103(a) over Schoppe (DE 39 18 412, "Schoppe") in view of Picard.

Applicants would like to review their invention in greater detail. According to the present invention, the optical properties of the components arranged in the beam path are coordinated with one another in such a way that the accumulated aberrations are at least of the order of magnitude of the theoretically achievable resolution capability. The sum of one type of aberration in the components to be incorporated into an optical calculation constitutes the accumulated aberrations. The theoretically achievable resolution capability in the context of a double confocal scanning microscope depends, like the resolution capability of a conventional microscope, on the wavelength of the light and the numerical aperture of the microscope objective being used. In a typical fluorescence application in the biomedical field, the lateral resolution capability of a confocal scanning microscope is approx. 200 nm, and the axial resolution capability approx. 600 to 800 nm. The term "lateral resolution" will be used hereinafter to refer to the resolution in the focal plane. The lateral resolution capability of a double confocal scanning microscope is substantially the same as that of a confocal scanning microscope, but the axial resolution capability of a double confocal scanning microscope lies in a range of approx. 100 to 200 nm. In order to achieve a maximum resolution capability, it is thus the values of the theoretical resolution capability of a double confocal scanning microscope which define the order of magnitude of the coordination range of the components of the double confocal scanning microscope according to the present invention arranged in the beam path. This order of magnitude of the coordination range can, however, fluctuate by a factor of as much as 10, depending on the demands placed on the double confocal scanning microscope. Coordination of the components arranged in the beam path can accordingly be accomplished in such a way that the accumulated aberrations, for example in the axial direction, lie between 10 and 1,000 nm.

In order for an obviousness rejection to be proper, the Patent Office must meet the burden of establishing a prima facie case of obviousness. The Patent Office must meet the burden of (1) establishing that all elements of the invention are disclosed in the cited publications, which (2) must have a suggestion, teaching or motivation for one of ordinary skill in the art to modify a reference or combined references.[1] The cited publications should (3) explicitly provide a reasonable expectation of success, determined from the position of one of ordinary skill in the art at the time the invention was made.[2]

(1) One of the main features of this invention, as reflected in pending Claim 1, is that the two microscope objectives are corrected and that the longitudinal chromatic aberrations are so corrected by the two oppositely disposed objectives that the resolution of the microscope is in the order of magnitude of the theoretically achievable resolution. The specification and dependent Claim 20 further specify that the theoretical achievable resolution of the present double confocal microscope is about 100 nm.

The above-described feature of the present invention could not be found in the Hell published application. The microscope in Hell uses the illuminating light of one wavelength λ, so Hell does not teach color correction in his microscope and, for the same reason, does not teach corrected microscope objectives specifically for correction of longitudinal chromatic aberrations. Needless to say, since the Hell microscope uses the light of one wavelength λ, no teaching with regard to color correction in the two microscope objectives leading to the resolution up to the theoretically achievable, as claimed in Claim 1, could be found in Hell. Since no color (no longitudinal chromatic aberration) correction takes place in the Hell microscope, the Patent Office is incorrect in its assertion that "the optical components disclosed in the double scanning microscope of Hell inherently possess such characteristics".

Moreover, in support of its assertion that all the limitation of Claim 1 can be found in Hell, the Patent Office wrote that "a laser" is understood as a light containing

---

1 *In re Sang Su Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).*
2 *In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); In re Wilson, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970);*
Amgen v. Chugai Pharmaceuticals Co., 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996);

different wavelengths..." It is known that a laser beam is generated due to the stimulated emission which forces the electrons to transition to a lower energy level from a higher energy level. As a result of the stimulated emission the laser beam is highly monochromatic and is characterized by one specific wavelength, which is determined by the amount of energy released during the transition to the lower energy level. Therefore, the Patent Office is incorrect in its assertion that the Hell microscope inherently contains illumination with different wavelength. The reference to fluorescent microscopy and a color beam splitter on page 4, column 5 of Hell, mentioned by the Patent Office, has nothing to do with illuminating the specimen with light of different wavelengths. The color beam splitter in Hell has to do with separating the excitation (shorter) and florescence (longer) wavelengths to separate detection light from illumination/excitation light. The excitation-fluorescent wavelength disparity is fundamental to the phenomenon of fluorescence and has nothing to do with illuminating the specimen with the light of more than one wavelength. Therefore nothing in Hell suggests explicitly or inherently that light of more than one wavelength can be used to illuminate the specimen in a color corrected fashion via two color corrected microscope objectives that reduce the longitudinal chromatic aberrations to the extent that the resolution along the optical axis approaches the theoretically achievable resolution, as claimed in Claim 1.

The Patent Office also cites Picard in support of its conclusion that "an illumination system in a scanning microscope having a laser of different wavelengths is known to one skilled in the art". Further it is asserted that "as a result of use laser [sic] having different wavelengths for illuminating a specimen in the system of Hell then the light passing through the opposite objectives will focus on particular focal length dependent upon wavelengths of light".

This conclusion is unwarranted and has nothing to do with the invention claimed in Claim 1 and its dependent claims. First of all, merely the fact that the refractive index of a material (a lens) is wavelength dependent, and that because of the dispersion of polychromatic light the components of the longer wavelength focus further away from the lens alone, is not the essence of Claim 1. The lens in Picard is uncorrected for chromatic aberrations, and that uncorrected lens generates a plurality of focal points due to natural dispersion of light of different wavelengths. Col. 5, lines 23-33. Such various

focal points allow the optical system in Picard to carry out in-depth 2-dimensional scanning of a specimen without sequential acquisition to the depth of about 0.5 micron.

The three focal planes of the present invention, such as claimed in Claims 1, 3 and 9, cannot be compared to the focal planes of Picard. The focal points on three planes of the present invention, corresponding to the light of three different wavelengths, are not the result of natural dispersion, as in Picard, but are the result of correction of longitudinal chromatic aberrations achieved by the oppositely spaced corrected microscope objectives. The two corrected microscope objectives focus the three light beams of different wavelengths to the focal points (planes) disposed so close to each other that the axial resolution of the microscope approaches the theoretical value, as claimed in Claim 1. An axial resolution approaches the theoretical value for a polychromatic light beam when various light components of different wavelength focus essentially onto the same plane, or the planes located so close to each other that the resolution remains at least of the order of magnitude of the theoretical value. Which is what is claimed in Claim 1 with regard to the resolution of the microscope. Evidently, the description of Picard in which one uses a non-corrected lens to generate a plurality of focusing points due to dispersion in the material is exactly the opposite of the claimed invention, which needs corrected microscope objectives to achieve the claimed resolution.

Also, the system of Picard combined with the oppositely spaced corrected microscope objectives in Hell will not result in the system as claimed in Claim 1, contrary to what is asserted by the Patent Office. The uncorrected lens in Picard will not focus the light to three different focal planes for the microscope resolution to be within the theoretical value, as claimed in Claims 1, 3 and 9. Therefore neither Picard nor Hell nor their combination discloses all elements of the invention and the first prong of the legal standard of obviousness is not met.

(2) Since neither Picard nor Hell discloses "the two corrected microscope objectives have optical properties and are arranged opposite of each other relative to a specimen, so that the longitudinal chromatic aberrations of the two corrected microscope objectives with respect to the optical axis are almost identical for the two microscope objectives,

and wherein a resolution of the microscope is at least the order of magnitude of a theoretically achievable resolution of the microscope" element of the invention as claimed in independent Claim 1, combining Picard and Hell does not disclose such element either.

Moreover, in accordance with *In re Lee*, the burden is on the Patent Office to point out where in Hell or Picard there is a suggestion or motivation to combine them to come up with the claimed invention. Nowhere either in Hell or Picard or their combination could a suggestion, teaching or motivation be found for one of ordinary skill in the art to modify a reference or combined references to come up with the invention as claimed. Therefore, the Patent Office has not met its burden of proof and prong (2) of the obviousness test is not met.

(3) Similarly, since neither Picard nor Hell nor their combination discloses all the elements of the claimed invention and provides no teaching or suggestion or motivation to combine Hell and Picard to come up with the claimed invention, the Patent Office could not point out to where these patents explicitly provide a reasonable expectation of success, determined from the position of one of ordinary skill in the art at the time the invention was made. Therefore, the third prong of the legal test for obviousness is not met.

Therefore, Claims 2-3, 8-9 and 19-20 are patentable, the rejection should be withdrawn and Claim 1 and its dependent Claims 2-3, 8-9 and 19-20 should be allowed.

(1) Turning now to Schoppe combined with Picard, the Applicants assert that the Shoppe microscope uses the light of one wavelength λ. No teaching with regard to color correction in the two microscope objectives leading to the resolution up to the theoretically achievable, as claimed in Claim 1, could be found in Shoppe. Since no color (no longitudinal chromatic aberration) correction takes place in the Shoppe microscope, the Patent Office is incorrect in its assertion that "the optical components disclosed in the double scanning microscope of Shoppe inherently possess such characteristics".

Moreover, the three focal planes of the present invention, such as claimed in Claims 1, 3 and 9, cannot be compared to the focal planes of Picard for the same reasons

as explained in Section I. The uncorrected lens in Picard will not focus the light to three different focal planes for the microscope resolution to be within the theoretical value, as claimed in Claims 1, 3 and 9. Therefore neither Picard nor Shoppe nor their combination discloses all elements of the invention and the first prong of the legal standard of obviousness is not met.

(2) Since neither Picard nor Shoppe discloses "the two corrected microscope objectives have optical properties and are arranged opposite of each other relative to a specimen, so that the longitudinal chromatic aberrations of the two corrected microscope objectives with respect to the optical axis are almost identical for the two microscope objectives, and wherein a resolution of the microscope is at least the order of magnitude of a theoretically achievable resolution of the microscope" element of the invention as claimed in independent Claim 1, combining Picard and Shoppe does not disclose such element either.

Moreover, in accordance with *In re Lee*, the burden is on the Patent Office to point out where in Shoppe or Picard there is a suggestion or motivation to combine them to come up with the claimed invention. Nowhere either in Shoppe or Picard or their combination could a suggestion, teaching or motivation be found for one of ordinary skill in the art to modify a reference or combined references to come up with the invention as claimed. Therefore, the Patent Office has not met its burden of proof and prong (2) of the obviousness test is not met.

(3) Similarly, since neither Picard nor Shoppe nor their combination discloses all the elements of the claimed invention and provides no teaching or suggestion or motivation to combine Shoppe and Picard to come up with the claimed invention, the Patent Office could not point out where these patents explicitly provide a reasonable expectation of success, determined from the position of one of ordinary skill in the art at the time the invention was made. Therefore, the third prong of the legal test for obviousness is not met.

Therefore, Claims 2-4, 8-9 and 19-20 are patentable, the rejection should be withdrawn and Claim 1 and its dependent Claims 2-4, 8-9 and 19-20 should be allowed.

Argument with respect to Group II.

Whether Claims 10 and 16-18 are patentable under 35 U.S.C. 103(a) over over Hell in view of Picard as applied to Claim 1 and further in view of Stern et al. (U.S. Patent 5,790,242).

Applicants submit that the Examiner has not met the burden of establishing a prima facie case of obviousness. Consider In re Lee: " Board of Patent Appeals and Interferences improperly relied upon 'common knowledge and common sense' of person of ordinary skill in the art to find invention of patent application obvious over combination of two prior art references . . ." 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). The CAFC went on to say: "In its decision on Lee's patent application, the board rejected the need for 'any specific hint or suggestion in a particular reference' to support the combination of the Northrup and Thunderchopper references. Omission of a relevant factor required by precedent is both legal error and arbitrary agency action." Id. at 1434. The applicant respectfully invites the Examiner to cite column and line number from within the cited references as to where a suggestion to combine may be found.

In order to place the case in better condition for appeal, the applicant would also like to bring to the Examiners attention: "Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching, suggestion or incentive supporting the combination." Carella v. Starlight Archery and Pro Line Co., 804 F.2d 135, 140, 231 USPQ 644, 647 (Fed. Cir. 1986) (citing ACS Hosp. Syss., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed Cir. 1984).

Even if the Examiner had created a *prima facie* case of obviousness, which Applicants in no way concede, Applicants rebut. Applicants direct Examiner's attention towards claim 10, which introduces two claim elements: "a detection pinhole and a dichroic beam splitter . . ." The Examiner's argument is entirely silent with respect to the dichroic beam splitter. Stern is also silent with respect to dichroic beam splitters. So, if

Stern, Picard and Hell were combined, one would still be missing this element and they would not equal the present invention of Claim 10. Claims 16-18 depend from Claim 10, and they would also not be rendered obvious by this combination.

Respectfully submitted,

By: _____

Maria M. Eliseeva
Registration No.: 43,328
Houston Eliseeva LLP
4 Militia Drive, Ste. 4
Lexington, MA 02421
Tel.: 781-863-9991
Fax: 781-863-9931

Date: August 12, 2004

Appendix

1. (Previously Presented) A double confocal scanning microscope for examining a specimen, the microscope comprising:

at least one light source defining an illuminating beam path and emitting coherent light of various wavelengths;

at least one detector defining detection beam path; and

two corrected microscope objectives defining an optical axis, a beam splitter, and a lens arranged in the illuminating beam path and the detection beam path,

wherein the two corrected microscope objectives have optical properties and are arranged opposite of each other relative to a specimen, so that the longitudinal chromatic aberrations of the two corrected microscope objectives with respect to the optical axis are almost identical for the two microscope objectives, and wherein a resolution of the microscope is at least the order of magnitude of a theoretically achievable resolution of the microscope.

2.(Previously Presented) The scanning microscope as defined in Claim 1, wherein the longitudinal chromatic aberrations of the two corrected microscope objectives are reduced with regard to a second plane being at least partially coincident with a focal plane of the two microscope objectives for light of a second wavelength.

3. (Previously Presented) The scanning microscope as defined in Claim 2 , wherein the second plane is symmetrically disposed between a first and a third planes, wherein the first plane is a focal plane of light of a first wavelength and wherein the third plane is a focal plane of light of a third wavelength.

4. (Previously Presented) The scanning microscope as defined in Claim 1, characterized in that the beam splitter of an interferometer is provided in the illuminating beam path and the detection beam path, thereby defining a first and a second individual partial beam paths along which the accumulated aberrations ~~of the~~ of the interferometer are made opposite to one another.

8. (Previously Presented) The scanning microscope as defined in Claim 3, wherein reduction of the chromatic aberrations occurs for the light of the first, second and third wavelengths selected from a wavelength range from about 200 nm to about 2000 nm.

9. (Previously Presented) The scanning microscope as defined in Claim 3, wherein polarization properties of the two microscope objectives disposed along the optical axis, ~~a~~ the beam splitter, and ~~a~~ the lens are coordinated with one another in such a way that the light of the first, second and third wavelengths is focused on the first, second and third plane accordingly.

10. (Previously Presented) The scanning microscope as defined in Claim 1, further comprising a detection pinhole and a dichroic beam splitter detecting the illumination beam path, wherein a position of at least the dichroic beam splitter or a position of at least the detection pinhole can be altered.

16. (Previously Presented) The scanning microscope as defined in Claim 10, wherein the detection pinhole is embodied as at least one chromatically selective component.

17. (Previously Presented) The scanning microscope as defined in Claim 16, wherein at least one chromatically selective component is provided for each detected wavelength region.

18. (Previously Presented) The scanning microscope as defined in Claim 16, further comprising a multi-band detector disposed after the chromatically selective component.

19. (Previously Presented) The scanning microscope of Claim 3, wherein the first wavelength is about 488 nm, the second wavelength is about 567 nm, and the third wavelength is about 647 nm.

20. (Previously Presented) The scanning microscope of Claim 1, wherein the theoretically achievable resolution capability of the microscope is about 100 nm.